1.2 pg. 16 #2, 3, 4*, 5, 7

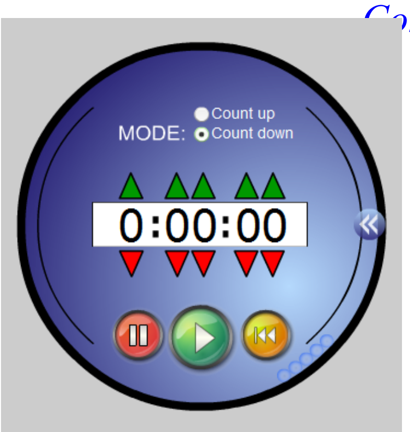
1.3 pg. 23 #3*, 4ad, 5, 7, 8, 10, 15

See next page for
Mr. Kennedy's full solution to p.23 #5f.

1.4 Worksheet #1-7 6, 5

Today's Work: pg. 60 #1 to 8, 9bde

Correction: #3 the range should be $\{y \in \Re \mid y \geq -1\}$



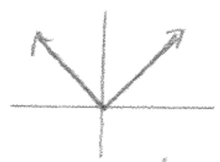
p. 23 **5.** For each function, determine $f(-x)$ and $-f(-x)$ and compare it with $f(x)$. Use this to decide whether each function is even, odd, or neither.

f) $f(x) = |2x + 3|$

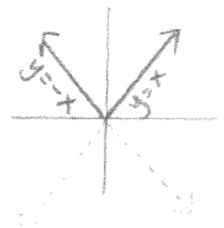
p23 #5f) Given: $f(x) = |2x+3|$

It is important to note that $|2(-x)+3|$ is <u>not</u> always $2x+3$ ...

For $y = |x|$, the graph is



Notice that it is the line $y = x$ as long as $x \geq 0$ and it is the line $y = -x$ as long as $x < 0$



Thus, $|2x+3|$ is $2x+3$ for $x \geq -1.5$

and $|2x+3|$ is $-(2x+3)$ otherwise.

We examine its symmetry via two cases ...

<u>$x \geq -1.5$</u>

$f(x) = |2x+3| = 2x+3$

Consider $f(-x) = 2(-x)+3$

$= -2x+3$

$\neq f(x)$ and

$\neq -f(x)$

Hence, for $x \geq -1.5$ it is neither even nor odd

<u>$x < -1.5$</u>

$f(x) = |2x+3| = -(2x+3)$

Consider $f(-x) = -[2(-x)+3]$

$= -(-2x+3)$

$= 2x-3$

$\neq f(x)$ and

$\neq -f(x)$

Hence, for $x < -1.5$ it is neither even nor odd

Hence, it is neither ☐

p. 16

4. Graph on a number line.

a) $|x| < 8$ **b)** $|x| \geq 16$ **c)** $|x| \leq -4$ **d)** $|x| > -7$

pg. 16 #2, 3, 4*, 5, 7.

**Final Answer Corrections:*

4c:  i.e. no solution (so no "shading")

4d:  i.e. entire number line (entire line is "shaded")

p. 23 **5.** For each function, determine $f(-x)$ and $-f(-x)$ and compare it with $f(x)$. Use this to decide whether each function is even, odd, or neither.

a) $f(x) = x^2 - 4$

b) $f(x) = \sin x + x$

c) $f(x) = \frac{1}{x} - x$

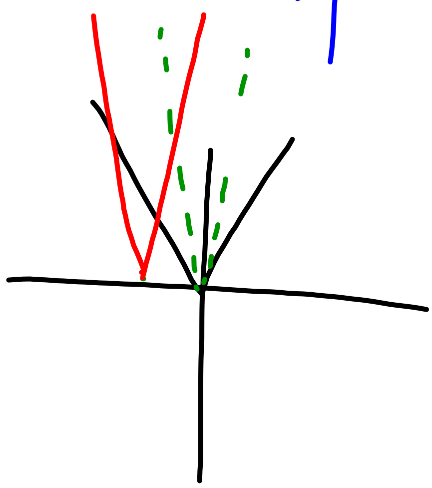
d) $f(x) = 2x^3 + x$

e) $f(x) = 2x^2 - x$

f) $f(x) = |2x + 3|$

5f) $f(x) = |2x+3|$

$= |2(x+\frac{3}{2})|$

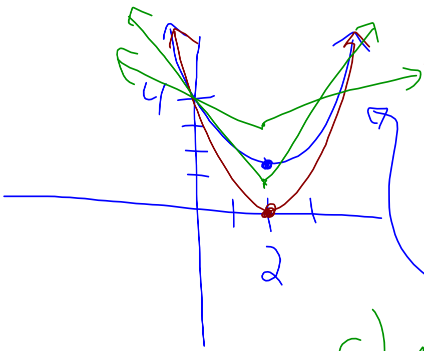


p. 23 **10.** a) $f(x)$ is a quadratic function. The graph of $f(x)$ decreases on the interval $(-\infty, 2)$ and increases on the interval $(2, \infty)$. It has a y-intercept at $(0, 4)$. What is a possible equation for $f(x)$?

T

b) Is there only one quadratic function, $f(x)$, that has the characteristics given in part a)?

c) If $f(x)$ is an absolute value function that has the characteristics given in part a), is there only one such function? Explain.



a) $y=(x-2)^2$

$(-\infty,-2)$ to $(-\infty,2]$

positive 2

square bracket

b) No, see blue curve

c) No, there are an infinite number of solutions.

p. 23 **15.** Explain why it is not necessary to have $h(x) = \cos(x)$ defined as a parent function.

Explanation: $\cos x$ is a horizontal translation of $\sin x$.

LESSON 1.4 PRACTICE

1. State the parent function and describe the transformations: $f(x)=\sqrt{4x-3}$

2. Using the parent function $y=f(x)$ state the new function under a horizontal stretch factor of 3, and a reflection in the y-axis

3. **Multiple Choice**. The point (3, 1) belongs to the function $y=f(x)$. Which of the following shows the correct order of transforming (3, 1) using $y=-3f(4x-4)+5$?
   a) $(3,1)\rightarrow(-9,4)\rightarrow(-8,9)$
   b) $(3,1)\rightarrow\left(\frac{3}{4},-3\right)\rightarrow\left(\frac{-1}{4},2\right)$
   c) $(3,1)\rightarrow\left(\frac{3}{4},-3\right)\rightarrow\left(\frac{7}{4},2\right)$
   d) $(3,1)\rightarrow(12,-9)\rightarrow(13,-4)$

3. **Multiple Choice**. The point (3, 1) belongs to the function $y=f(x)$. Which of the following shows the correct order of transforming (3, 1) using $y=-3f(4x-4)+5$?
   a) $(3,1)\rightarrow(-9,\cancel{4)}\rightarrow(-8,9)$ $\quad = -3f(4(x-1))+5$
   b) $(3,1)\rightarrow\left(\frac{3}{4},-3\right)\rightarrow\left(\frac{-1}{4},2\right)$
   c) $(3,1)\rightarrow\left(\frac{3}{4},-3\right)\rightarrow\left(\frac{7}{4},2\right)$ $\quad (x,y)\rightarrow\left(\frac{1}{4}x+1,\ -3y+5\right)$
   d) $(3,1)\rightarrow(12,-\cancel{9)}\rightarrow(13,-4)$

4. Determine the equation based on the described transformations:

a) The graph of $y = |x|$ is translated up 3 units.

b) The graph of $y = \sin x$ is reflected in the y-axis.

c) The graph of $y = x$ is stretched vertically by a factor of 7, compressed horizontally by a factor of $\frac{1}{4}$, and translated up 5 units.

d) The graph of $y = \frac{1}{x}$ is reflected in the x-axis.

e) The graph of $y = x^2$ is stretched vertically by a factor of 2 and translated up 4 units.

f) The graph of $y = \sqrt{x}$ is translated left 4 units and up 12 units.

5. Graph $y=\frac{1}{x}$, by including all key points.

By using MAPPING FORMULAS, graph $y=-\frac{1}{2x}$ and $y=-\frac{1}{2(x+3)}-7$.

$y=\frac{1}{x}$ $y=-\frac{1}{2x}$

(x,y)

$(\frac{1}{2},2) \to$

$(1,1) \to$

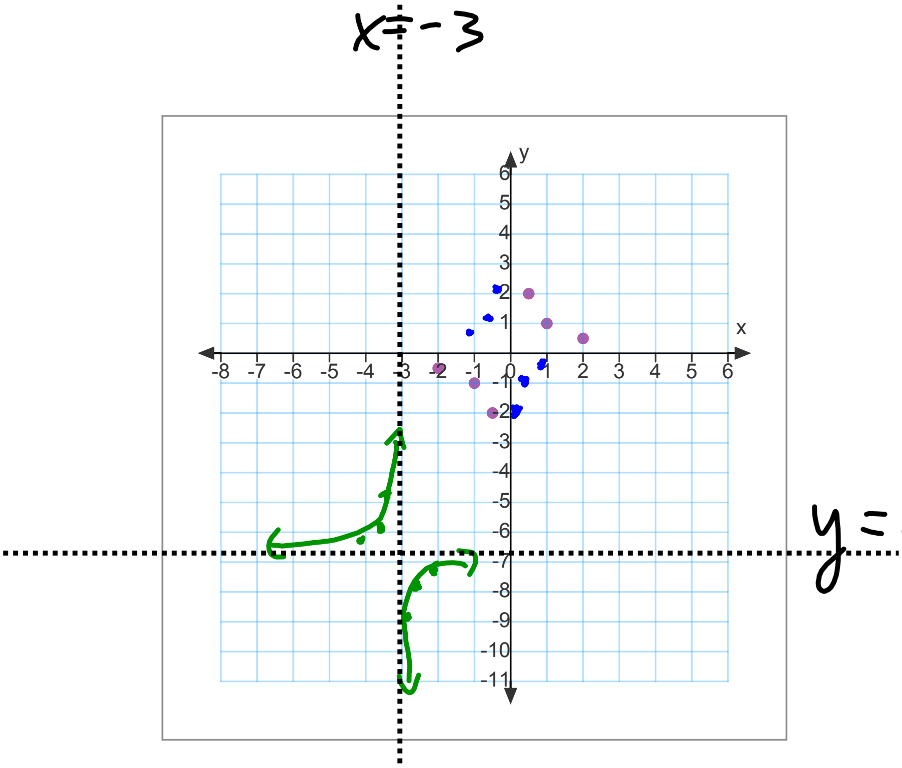
$(2,\frac{1}{2}) \to$

$(-\frac{1}{2},-2) \to$

$(-1,-1) \to$

$(-2,-\frac{1}{2}) \to$

$x=-3$



$y=-7$

5. Graph $y=\frac{1}{x}$, by including all key points.

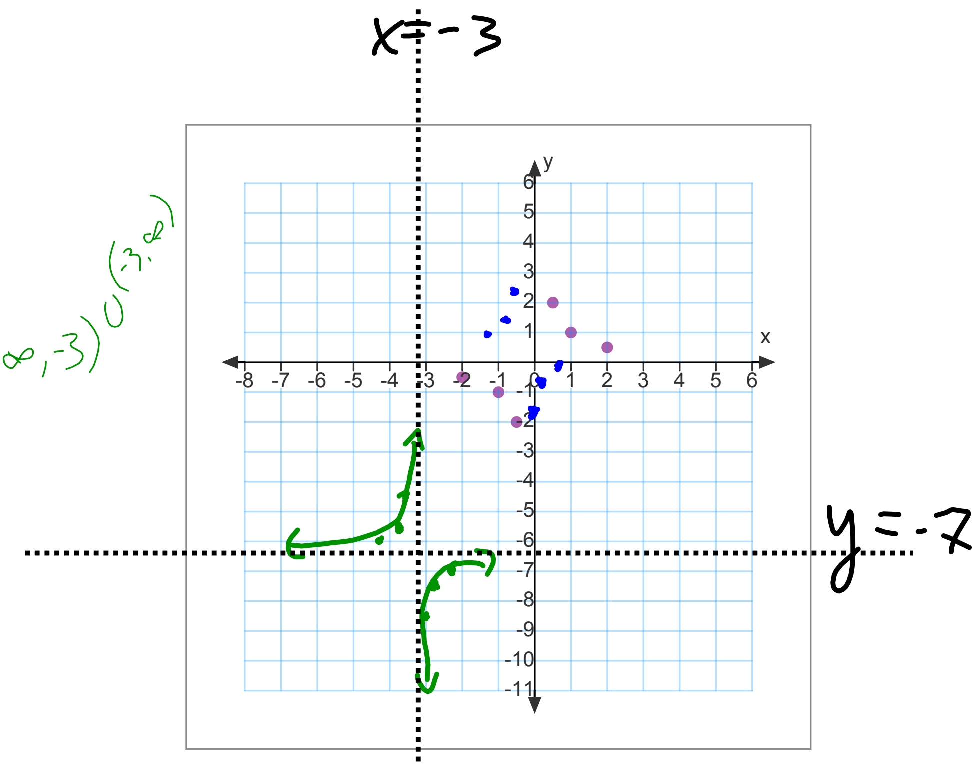
$(x,y) \to (\frac{1}{k}x+d,\ ay+c)$

$a=-1 \quad k=2$

By using MAPPING FORMULAS, graph $y=-\frac{1}{2x}$ and $y=-\frac{1}{2(x+3)}-7$.

$y=\frac{1}{x}$ | $y=-\frac{1}{2x}$ |
---|---|---
(x,y) | $\to (\frac{1}{2}x,\ -y)$ | $\to (\frac{1}{2}x-3,\ -y-7)$
$(\frac{1}{2},2)$ | $\to (\frac{1}{4},\ -2)$ | $\to (\frac{1}{4}-3,\ -9)$ $= -2\frac{3}{4}$
$(1,1)$ | $\to (\frac{1}{2},\ -1)$ | $\to (-2\frac{1}{2},\ -8)$
$(2,\frac{1}{2})$ | $\to (1,\ -\frac{1}{2})$ | $\to (-2,\ -7\frac{1}{2})$
$(-\frac{1}{2},-2)$ | $\to (-\frac{1}{4},\ 2)$ | $\to (-3\frac{1}{4},\ -5)$
$(-1,-1)$ | $\to (-\frac{1}{2},\ 1)$ | $\to (-3\frac{1}{2},\ -6)$
$(-2,-\frac{1}{2})$ | $\to (-1,\ \frac{1}{2})$ | $\to (-4,\ -6\frac{1}{2})$

$f(x) =$
$af(k(x-d))+c$



$D_G: x \in (-\infty,-3) \cup (-3,\infty)$

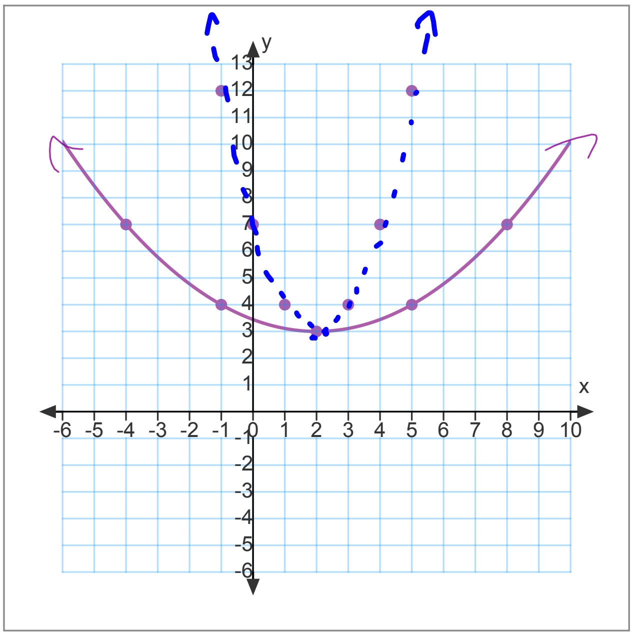
$R_G:$

6. Graph $f(x) = x^2$, by including all key points. **Without using a mapping formula** graph $y = f(-\frac{1}{3}x + \frac{2}{3}) + 3$.

$y = \left(\frac{-1}{3}(x-2)\right)^2 + 3$

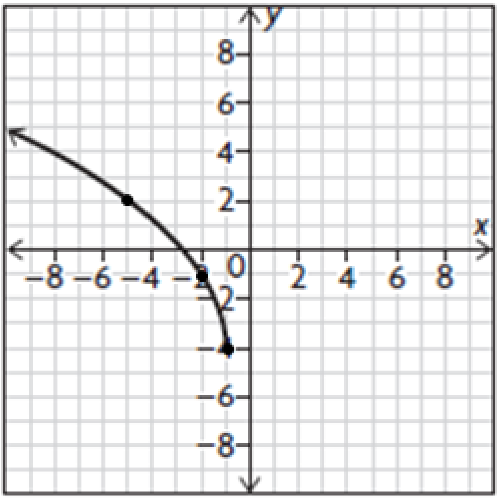
$= f\left(-\frac{1}{3}(x-2)\right) + 3$

$= \left(-\frac{1}{3}(x-2)\right)^2 + 3$

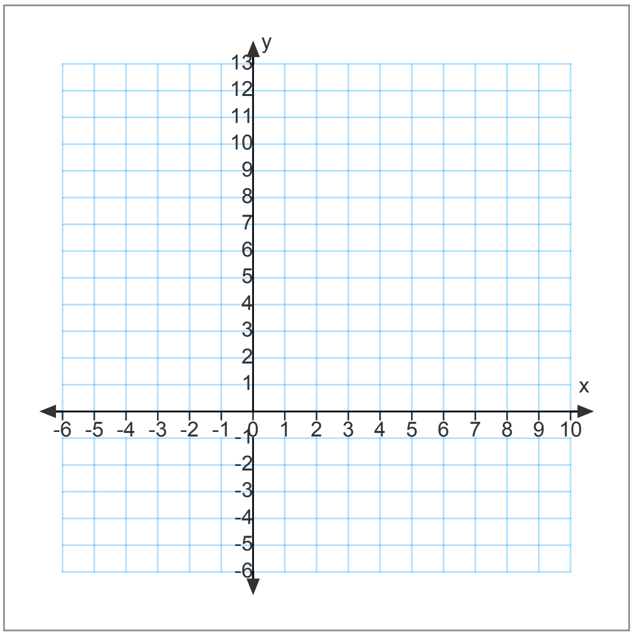


7. Describe the transformations applied, in order, to $f(x) = \sqrt{x}$, to create the graph below:

Done on next screen.



6. Graph $f(x) = x^2$, by including all key points. **Without using a mapping formula** graph $y = f(-\frac{1}{3}x + \frac{2}{3}) + 3$.



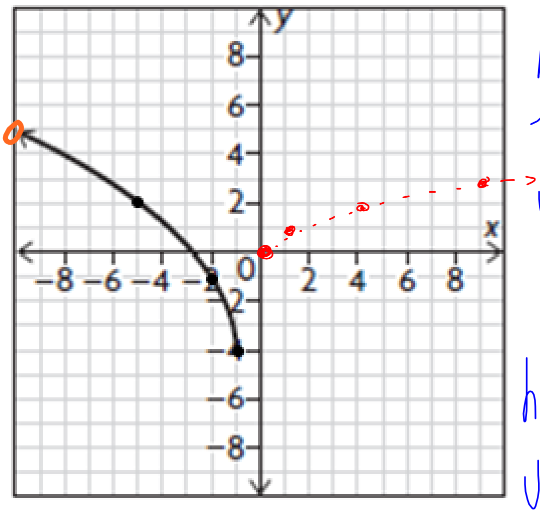
7. Describe the transformations applied, in order, to $f(x) = \sqrt{x}$, to create the graph below:

parent function: $y = \sqrt{x}$

ref! in y-axis

$k < 0$

$d = -1$ $c = -4$



Order:

reflection in the y-axis

V.S. by a factor of 3

h.t. 1 unit left

v.t. 4 units down

$\therefore y = 3\sqrt{-(x+1)} - 4$